

We claim:

1. A process for preparing hydrogen cyanide by autothermal noncatalytic oxidation of one or more nitrogenous hydrocarbons or a nitrogenous hydrocarbon mixture in which the nitrogenous hydrocarbons, an oxygen-containing gas, with or without ammonia, with or without water, with or without a gas containing nitrogen oxides and with or without other essentially inert feed gas constituents are introduced into a flame reaction zone, react in the flame reaction zone and a post-reaction zone at a temperature of from 1000 to 1800°C for a reaction time of 0.03 to 0.3 s to form a cleavage gas which comprises at least the constituents hydrogen cyanide, carbon oxides, hydrogen, water, ammonia, nitrogen, light hydrocarbons with or without other cleavage gas constituents, the atomic C/N ratio in the reaction zones being from 1 to 7 and the atomic air ratio λ_{ato} being <0.6, the cleavage gas being cooled and separated.
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2. A process as claimed in claim 1, wherein ammonia is introduced into the flame reaction zone.
3. A process as claimed in claim 1 or 2, wherein the nitrogenous hydrocarbons used have a C/N ratio of from 1 to 5.
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4. A process as claimed in claim 1 or 2, wherein the nitrogenous hydrocarbons used have a C/N ratio of from 5 to 7.
- 25 5. A process as claimed in one of claims 1 to 4, wherein the nitrogenous hydrocarbons used are residues.

6. A process as claimed in one of claims 1 to 5, wherein water is introduced into the flame reaction zone.

5 7. A process as claimed in one of claims 1 to 6, wherein essentially inert-behaving further feed gas constituents are introduced into the flame.

10 8. A process as claimed in claim 7, wherein the essentially inert-behaving further feed gas constituents comprise carbon oxides and/or hydrogen obtained from the cleavage gas.

9. A process as claimed in one of claims 1 to 8, wherein a nitrogen oxide-containing gas is introduced into the flame reaction zone.

15 10. A process as claimed in one of claims 1 to 9, wherein the nitrogenous hydrocarbons or hydrocarbon mixtures used are introduced in liquid form into the flame reaction zone.

11. A process as claimed in claim 10, wherein the nitrogenous hydrocarbons used are atomized to form liquid droplets having a mean particle diameter of <100 μm .

20 12. A process as claimed in claim 10 or 11, wherein the nitrogenous hydrocarbons or hydrocarbon mixtures used are introduced as aqueous emulsion into the flame reaction zone.

25 13. A process as claimed in claim 12, wherein the aqueous emulsion used is atomized to form liquid droplets having a particle diameter of <100 μm .

14. A process as claimed in one of claims 1 to 9, wherein the nitrogenous hydrocarbons used are introduced in the gaseous state into the flame.

5 15. A process as claimed in claim 14, wherein the gaseous nitrogenous hydrocarbons are premixed with at least a part of the feed gas constituents selected from the oxygen-containing gas, ammonia, the nitrogen oxide-containing gas, water and the essentially inert-behaving feed gas constituents, and the resultant gas mixture is introduced into the flame reaction zone.

10 16. A process as claimed in one of claims 1 to 15, wherein turbulent flow prevails in the reaction zones.

15 17. A process as claimed in one of claims 1 to 16, wherein the resultant cleavage gas comprises at least the constituents hydrogen cyanide, carbon oxides, hydrogen, water, ammonia, nitrogen and light hydrocarbons and the separation of the resultant cleavage gas comprises the steps:

20 (i) cooling the cleavage gas to a temperature <300°C;

(ii) removing ammonia as ammonium sulfate or ammonium phosphate by gas scrubbing, with an ammonia-depleted cleavage gas being obtained;

25 (iii) removing hydrogen cyanide as aqueous hydrogen cyanide solution, a hydrogen cyanide-depleted and ammonia-depleted residual cleavage gas being obtained;

(iv) recovering hydrogen cyanide from the aqueous hydrogen cyanide solution by distillation;

(v) where appropriate, partially recirculating the residual cleavage gas to the flame reaction zone.